15.190 Lambda
15.230
40

INSTRUCTION MANUAL

REGULATED POWER SUPPLIES

LOS-V SERIES

SPECIFICATIONS AND FEATURES

MP MASTER
MA28832

DC OUTPUT — Voltage regulated for line and load. For voltage and current ratings see table I below.

TABLE I

MODEL	VOLTAGE RANGE	MAXIMUM CURRENT (AMPS) AT AMBIENT TEMPERATURE		
		40°C	50°C	60°C
LOS-V-2	2 ±5%	17.0	14.5	11.5
LOS-V-5-OV	5 ±5%	17.0	14.5	11.5
LOS-V-6	6 ±5%	15.5	13.0	10.3
LOS-V-12	12 ±5%	10.8	9.0	6.7
LOS-V-15	15 ±5%	9.5	7.6	5.6
LOS-V-20	20 ±5%	7.7	6.0	4.3
LOS-V-24	24 ±5%	6.6	5.2	3.8
LOS-V-28	28 ±5%	5.9	4.6	3.3

Current range must be chosen to suit the appropriate maximum ambient temperature. Current ratings apply for entire voltage range.

REGULATED VOLTAGE OUTPUT

Regulation (line) ..... 0.15% for input variations from 105-125 or 125-105 volts AC.

Regulation (load) ..... 0.15% for load variations from 10% load to full load or full load to 10% load.

Ripple and Noise ..... 1.5 mV rms, 5 mV peak to peak with either positive or negative terminal grounded.

Temperature Coefficient ..... 0.03%/°C

Remote Programming

External Resistor ..... Nominal 200 ohms/volt output.

Programming Voltage ..... One-to-one voltage change.

Remote Sensing ..... Provision is made for remote sensing to eliminate the effect of power output lead resistance on DC regulation.

OVERSHOOT — No overshoot under conditions of power turn-on, turn-off, or power failure.

AC INPUT — 105-125 volts AC at 47-440 Hz. Input power: 320 Watts* Ratings apply for 57-63 Hz input. For 47-53 Hz input derate current 10% for each ambient temperature given in table I. For 63-440 Hz input consult factory.

*With output loaded to full current rating and input voltage 125 volts AC, 60 Hz.

OVERLOAD PROTECTION — Automatic electronic current limiting circuit, limits output current to a safe value, protecting load and power supply when external overloads and direct shorts occur.

OVERVOLTAGE PROTECTION — Model LOS-V-5-OV includes a fixed built-in overvoltage protection circuit which prevents damage to the load caused by excessive power supply output voltage. Overvoltage protection firing range is between 6.2 and 7.4 volts D.C.

INPUT AND OUTPUT CONNECTIONS — See outline drawing for location.

AC input	Terminals on transformer
Ground	Terminal on transformer
DC output	Turret terminal on printed circuit board
Sensing	Turret terminal on printed circuit board

OPERATING AMBIENT TEMPERATURE RANGE AND DUTY CYCLE — Continuous duty from 0°C to +60° C ambient with corresponding load current ratings for all modes of operation.

STORAGE TEMPERATURE — -20°C to +85°C

DC OUTPUT CONTROL — Screwdriver voltage adjust control permits adjustment of DC output voltage. See outline drawing for location of control.

GUARANTEE — 60 day guarantee from date of shipment ..... materials and labor.

PHYSICAL DATA

Size	4-7/8" x 13-3/4" x 4-7/8"
Weight	10-1/4 lbs. net; 11-3/4 lbs. shipping
Finish	Gray, FED. STD. 595 No. 26081

MOUNTING — Three surfaces, each with clearance mounting holes, can be utilized for mounting this unit. All LOS-V power supplies can be mounted with Top, Front or Rear facing up. Top, Front, or Rear must be in a horizontal plane. Air circulation is required when unit is mounted in confined areas. Refer to Outline Drawing for mounting details.

ACCESSORIES

Overvoltage protector	Externally mounted Overvoltage Protectors LMOV-1, LMOV-2, and LMOV-3 are available for use with all models except LOS-V-5-OV. Additional wire must be added to the Overvoltage Protector leads in order to reach the power supply output terminals.

THEORY OF OPERATION

The Lambda power supply consists of an AC input circuit and transformer; a bias supply consisting of an auxiliary rectifier and filter; and a main regulator circuit consisting of the main rectifier filter, series regulator transistors, and Integrated Circuit Regulator (IC101). The circuit arrangement is shown in block diagram form, Figure 7.

Single phase input power is applied to transformer T1.

The main rectifier, a full wave rectifier, provides the power which is filtered by capacitor C1 and then regulated via series regulators Q2-Q6. Auxiliary rectifiers CR101 and CR102 provide voltage filtered by capacitor C101 for regulator control circuits located in IC101.

OV CIRCUIT, FUNCTIONAL DESCRIPTION (LOS-V-5-OV ONLY)

When the power supply output voltage increases above zener breakdown voltage of CR3 (approximately 6.2 volts) and gate voltage of SCR1 (approximately 0.6 volts), CR3 conducts and current is supplied to the gate of SCR1. SCR1 fires causing the power supply output voltage to drop.

OPERATING INSTRUCTIONS

BASIC MODE OF OPERATION

This power supply operates as a constant voltage source provided the load current does not exceed the rated value at 40°C. For continuous operation, load current must not exceed the rating for each ambient temperature. When rated load current is exceeded, both voltage and current decrease until voltage reaches zero and the current at short circuit is reduced to a safe value, which is less than the 40°C current rating.

CONNECTIONS FOR OPERATION

NOTE: Make all connections to the unit before applying AC input power.

Ground Connections. The Lambda power supply can be operated either with negative or positive output terminal grounded. Both positive and negative ground connections are shown in the diagrams for all suggested output connections illustrated in this manual.

Connection Terminals. Make all connections to the supply at the turret and transformer terminals. Apply input power to transformer terminals. See outline drawing for location of terminals.

The supply positive terminal is brought out to terminal +V. The supply negative terminal is brought out to terminal -V. Recommended wiring of the power supply to the load and selection of wiring is shown in figures 1 through 6. Selection of proper wiring is made on the basis of load requirements. Make all performance checks and measurements of current or voltage at the output terminals. Connect measuring devices directly to terminals or use the shortest leads possible.

SUPPLY LOAD CONNECTIONS

Connections for Operation as a Constant Voltage Source

The output impedance and regulation of the power supply at the load may change when using the supply as a constant voltage source and connecting leads of practical length are used. To minimize the effect of the output leads on these characteristics, remote sensing is used. Recommended types of supply-load connections with local or remote sensing are described in the following paragraphs.

Refer to figure 1 to determine voltage drop for particular cable length, wire size and current conditions. Lead lengths must be measured from supply terminals to load terminals as shown in figure 2.

Local Sensing Connection, Figure 3. The two-wire connection with local sensing is the connection suitable for applications with relatively constant load.

Remote Sensing Connection, Figure 4. The four-wire connection with remote sensing, provides complete compensation for the DC voltage drops in the connecting cables. Sensing leads should be a twisted pair to minimize AC pick-up. A 2.5 mf elect., capacitor may be required between output terminals and sense terminals to reduce noise pick-up.

Programmed Voltage Connections, Using External Resistor, Figure 5. Discrete voltage steps can be programmed with a resistance voltage divider valued at a nominal 200 ohms/volt change and a shorting-type switch as shown in figure 5. When continuous voltage variations are required, use a variable resistor with the same 200 ohms/volt ratio in place of the resistive voltage divider and shorting-type switch. Use a low temperature coefficient resistor to assure most stable operation.

Before programming, adjust programming resistor for zero resistance and set voltage adjust control to the minimum rated output voltage. Output voltage of programmed supply will nominally be minimum output voltage plus 1 volt per 200 ohms.

As shown in figure 5, voltages can be programmed utilizing either local or remote sensing connections, as desired.

Programmed Voltage Connections Using Programming Voltage, Figure 6. The power supply voltage output can be programmed with an externally connected programming power supply. The output voltage change of the programmed supply will maintain a one-to-one ratio with the voltage of the programming supply. If the output voltage control of the programmed supply is set to minimum output voltage, output voltage of programmed supply will be minimum output voltage plus voltage of programming supply.

The programming supply must have a reverse current capability of 6 ma. minimum.

Alternatively, when supplies with less than 6 ma. reverse current capability are used, a resistor capable of drawing 6 ma. at the minimum programming voltage must be connected across the output terminals of the supply. This programming supply must be rated to handle all excess resistor current at the maximum programming voltage.

OPERATION AFTER PROTECTIVE DEVICE SHUTDOWN

Overvoltage Shutdown

When the power supply output voltage increases above the overvoltage limit, SCR1 will short circuit output of the supply. After eliminating the cause(s) for overvoltage, resume operation of the supply by momentarily interrupting the AC input circuit.

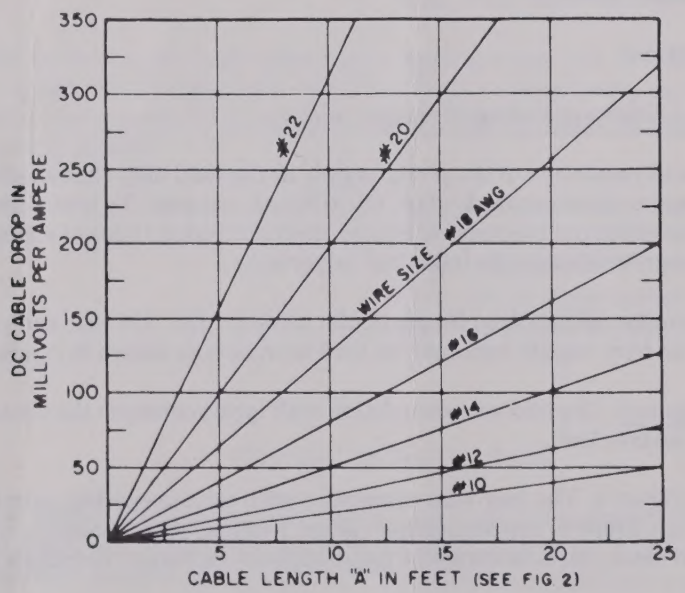


Figure 1. Cable Connection Chart

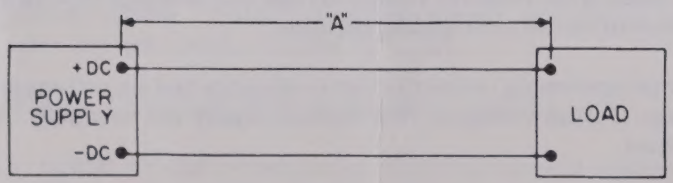
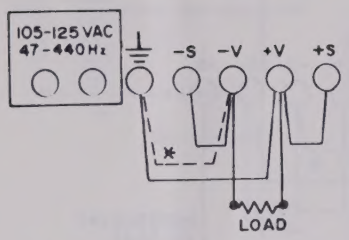
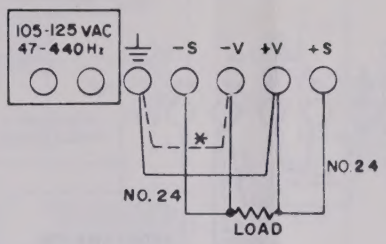


Figure 2. Cable Length "A" in Feet



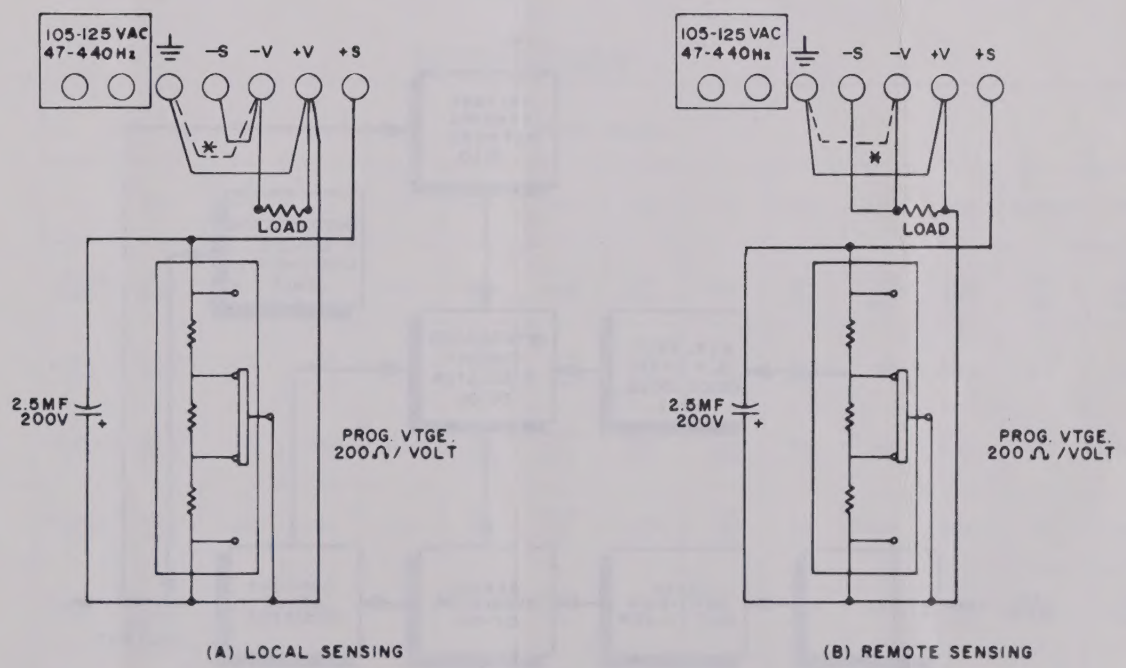
NOTE:
* FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS ⏚ AND +V AND RECONNECT TO TERMINALS ⏚ AND -V.

Figure 3. Two-Wire Connection



NOTE:
* FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS ⏚ AND +V AND RECONNECT TO TERMINALS ⏚ AND -V.

Figure 4. Four-Wire Connection



NOTE:
* FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS ⏚ AND +V AND RECONNECT TO TERMINALS ⏚ AND -V.

Figure 5. Programmed Voltage, With External Resistor

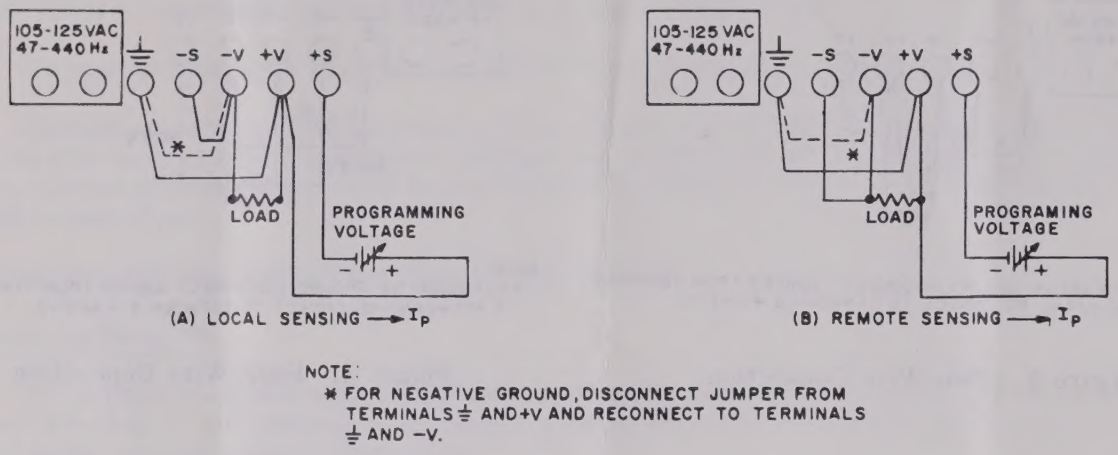


Figure 6. Programmed Voltage, With External Programming Voltage Source

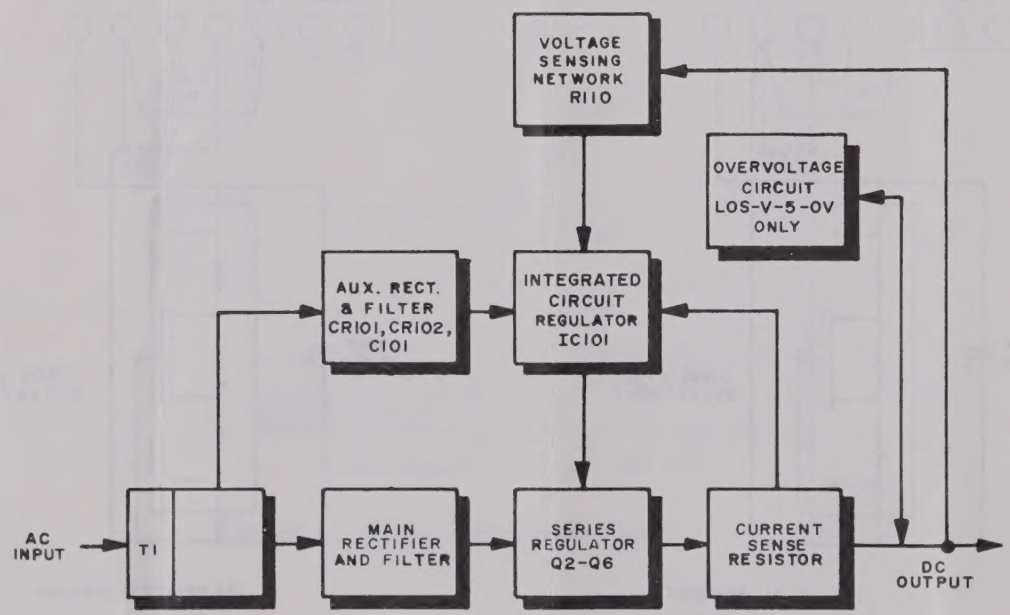
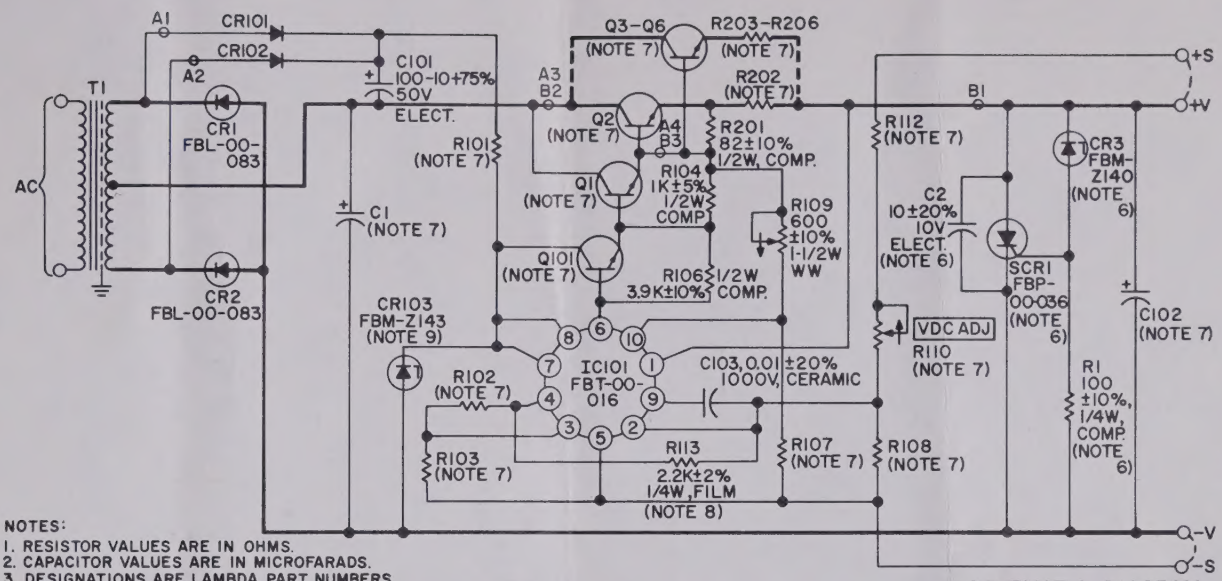


Figure 7. Typical Block Diagram



NOTES:
1. RESISTOR VALUES ARE IN OHMS.
2. CAPACITOR VALUES ARE IN MICROFARADS.
3. DESIGNATIONS ARE LAMBDA PART NUMBERS.
4. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES CONNECTION TO CHASSIS.
   - LAMBDA PART NO. FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED CIRCUIT BOARD.
   - INDICATES ACTUAL UNIT MARKING.
5. FOR OPERATION AT 47-53Hz, DERATE CURRENT BY 10%. FOR OPERATION AT 63-440Hz, CONSULT FACTORY.
6. C2, CR3, R1 AND SCR1 ONLY USED ON MODEL LOS-V-5-OV.
7. SEE TABLE II FOR COMPONENT VALUES.
8. R113 ONLY USED ON MODEL LOS-V-2.
9. CR103 ONLY USED ON MODELS LOS-V-12 THRU LOS-V-28.

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIX A.

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

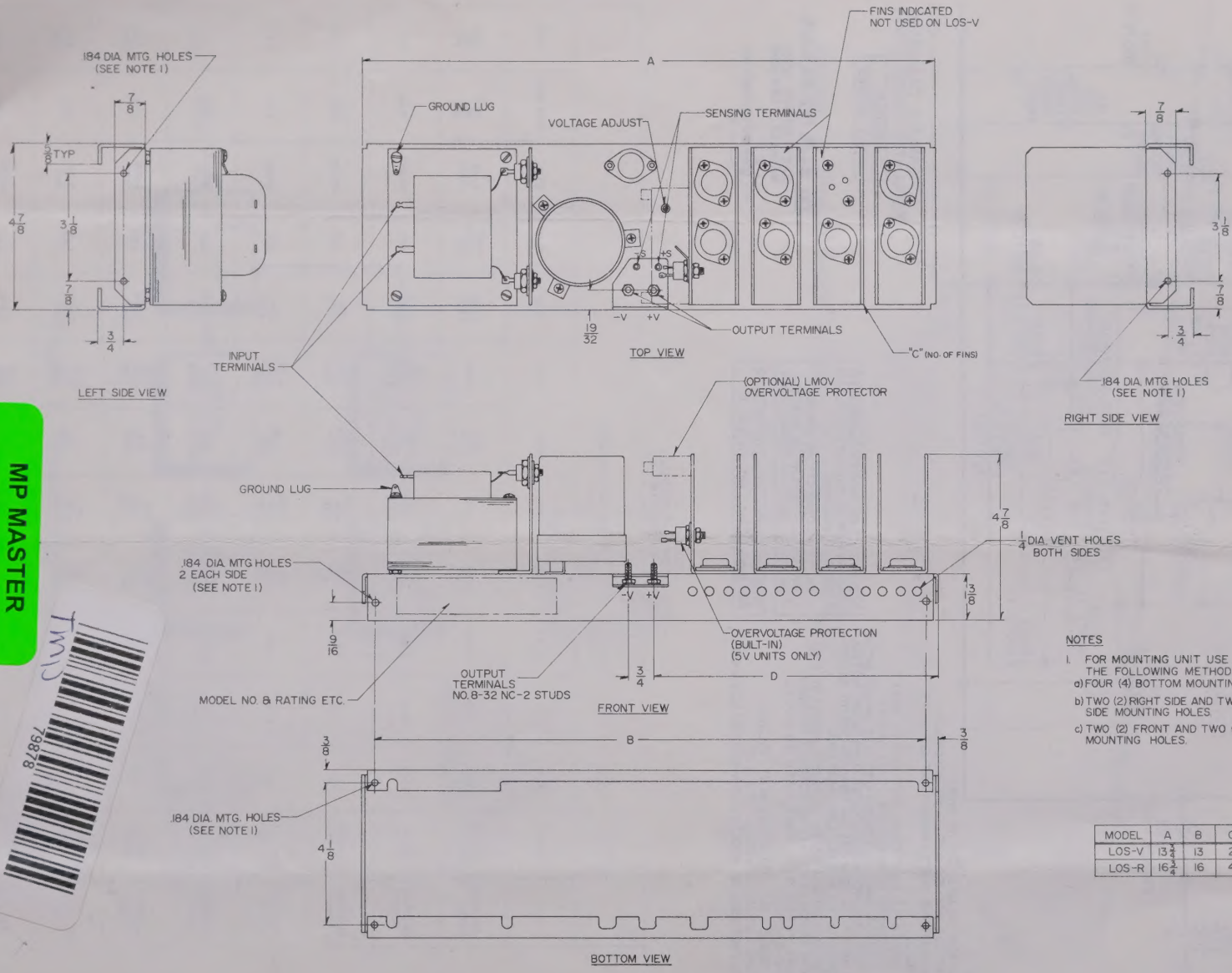
MODELS
LOS-V SERIES

LAMBDA
ELECTRONICS CORP.
MELVILLE, NEW YORK
A Veeco SUBSIDIARY

TABLE II
SCHEMATIC DATA REFERENCES
MODELS LOS-V-2 THRU LOS-V-28

Models	Schematic Components													
	C1	C102	Q1-Q5	Q6	Q101	R101	R102	R103	R107	R108	R110	R112	R202-R205	R206
	-10+100% ELECT	-10+75% ELECT	*FBN-	*FBN-	*FBN-	COMP	FILM	1/4W FILM	COMP	1/4W FILM	±10% 1-1/2W WW	1/4W FILM	±5% 2W WW	±5% 2W WW
LOS-V-2	26,000 mf 15 vdc	2040 mf 16 vdc	L157	L157	L113	47 ±5% 1/2W	4.7K ±2% 1/4W	2.2K ±2%	1.2K ±10% 1/2W	2.2K ±2%	600	Jumper	0.10	0.10
LOS-V-5-OV	26,000 mf 15 vdc	2040 mf 16 vdc	L157	L157	L113	200 ±5% 1/2W	2.49K ±1% 1/2W	3.83K ±1%	2.7K ±10% 1/2W	825 ±1%	600	Jumper	0.10	0.10
LOS-V-6	26,000 mf 15 vdc	2040 mf 16 vdc	L157	L157	L113	200 ±5% 1/2W	2.49K ±1% 1/2W	3.83K ±1%	2.7K ±10% 1/2W	825 ±1%	600	Jumper	0.10	0.10
LOS-V-12	16,000 mf 30 vdc	1200 mf 25 vdc	L156	Not Used	L109	1K ±10% 2W	619 ±1% 1/4W	Not Used	6.2K ±5% 1/2W	1.47K ±1%	600	786 ±1%	0.15	Not Used
LOS-V-15	16,000 mf 30 vdc	1200 mf 25 vdc	L156	Not Used	L109	1K ±10% 2W	619 ±1% 1/4W	Not Used	7.5K ±5% 1/2W	1.47K ±1%	1.2K	1.21K ±1%	0.15	Not Used
LOS-V-20	12,500 mf 50 vdc	722 mf 50 vdc	L156	Not Used	L109	3.3K ±10% 2W	1K ±1% 1/2W	Not Used	9.1K ±5% 1/4W	1.47K ±1%	1.2K	2.2K ±2%	0.30	Not Used
LOS-V-24	12,500 mf 50 vdc	722 mf 50 vdc	L156	Not Used	L109	3.3K ±10% 2W	1K ±1% 1/2W	Not Used	10K ±5% 1/2W	1.47K ±1%	1.2K	3.01K ±1%	0.30	Not Used
LOS-V-28	12,500 mf 50 vdc	722 mf 50 vdc	L156	Not Used	L109	5.6K ±10% 2W	1K ±1% 1/2W	Not Used	12K ±5% 1/2W	1.47K ±1%	1.8K	3.48K ±1%	0.30	Not Used

*Lambda part no.



NOTES

1. FOR MOUNTING UNIT USE ONE OF THE FOLLOWING METHODS:
   a) FOUR (4) BOTTOM MOUNTING HOLES.
   b) TWO (2) RIGHT SIDE AND TWO (2) LEFT SIDE MOUNTING HOLES.
   c) TWO (2) FRONT AND TWO (2) REAR MOUNTING HOLES.

MODEL	A	B	C	D
LOS-V	13 3/4	13	2	5 9/32
LOS-R	16 3/4	16	4	8 7/32

MP MASTER
MA28832
TWJ
7987B

Outline Drawing